WindObserver 90

User Manual

Ultrasonic Anemometer

(Parts 1390-90-B-XXX and 1390-90-B-XXX)

Doc No: 1390-PS-0041

Issue A

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1. FORWARD

Thank you for purchasing the WindObserver 90 manufactured by Gill Instruments Ltd. The unit has no customer serviceable parts and requires no calibration or maintenance. To achieve optimum performance we recommend that you read the whole of this manual before proceeding with use. Do **NOT** remove black "rubber" transducer caps.

Gill products are in continuous development and therefore specifications may be subject to change and design improvements without prior notice.

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2. INTRODUCTION

The WindObserver 90 wind sensor is a very robust unit with no moving parts, outputting wind speed and direction. The units of wind speed, output rate and formats are all user selectable.

The WindObserver 90 is available with optional enhanced de-icing heating (recommended if severe icing is likely).

The WindObserver 90 can be used in conjunction with a PC, data logger or other device, provided it is compatible with the RS422 output. Multiple units can be networked if required.

Alternatively, the WindObserver 90 is designed to connect directly to the Gill WindDisplay unit to provide a complete wind speed direction system.

The output message format can be configured in Polar, UV (2-axis), NMEA (0183 Version 3), Tunnel formats, and as either a Continuous output or Polled (requested by host system), detailed in full in Section 8 Message Formats & Options.

3. FAST TRACK SET-UP

If you are in a hurry to try out the WindObserver 90, are familiar with Gill equipment, and coupling to a PC using RS422, go to the following sections:

Section 6 Installation

Section 7 Message Formats & Options

Section 8 Configuring

After you have successfully set up the WindObserver 90, we strongly advise that you then go back and read the rest of the manual to ensure that you get the best results from the WindObserver 90.

4. SPECIFICATION

Measurement		
Output	1 Hz	
Parameters	UV, Polar, NMEA	
Units	m/s, Knots, MPH, KPH ft/min	
Averaging	Flexible 1-3600 seconds or Adjustable Averaging for Road Weather applications	
Wind Speed		
Range	0 - 90m/s (201mph)	
Accuracy	±2%@12m/s	
Resolution	0.01m/s	
Offset	±0.01m/s	
Direction		
Range	0 - 359°	
Accuracy	± 2°	
Resolution	1°	
Anemometer Status	Supplied as part of standard message	
Starting Threshold	0.01 m/s	
Dead Band Wind Direction	None	
Power Requirement		
Anemometer only	9-30 V DC 50mA average, reverse voltage protected	
Heating - **Optional**	Allow for 7A @ 24v AC rms ± 15%, or 24v DC± 10%.	
Digital Output		
Communication	RS422, full duplex, network facility	
Baud rates	1200, 2400, 4800, 9600, 19200, 38400	
Formats	8 data, odd, even or no parity	
Dimensions		
Size	See Manual Figure 2b drawings for dimensions	
Weight	WindObserver 90	1.34kg (no mount or lead)
	Base Mount Short	0.63kg.
	Base Mount Long	1.05kg.
	Pipe Mount	1.06kg.
Materials		
External Construction	Stainless Steel 316	
Environmental		
Moisture protection	IP66 (NEMA4X)	
Operating temperature	-55°C to +70°C, heating on	
Humidity	0% to 100% RH	
Precipitation	300mm/hr, Mil Std 810f Method 506.4	
EMC	EN 61326-1: 2006 EN 60945:2002	
Icing	MIL STD 810F Method 521.1 Procedure 1	
Standards	Traceable to UK national standards	
Site Calibration	None required. (See Section 9.6 Zero Wind Check)	

WARNING NOTE:-

When heating is activated the bullet and transducer arms will get very hot and should not be handled.

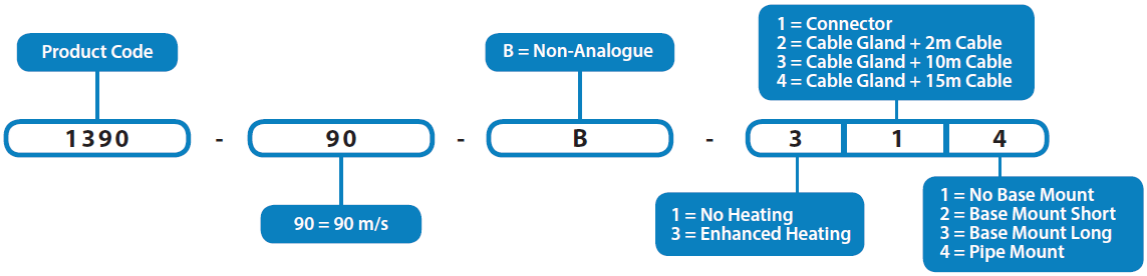
5. PRE-INSTALLATION

5.1. Equipment supplied

WindObserver 90.
and Installation kit.
and WindObserver 90 User Manual on a CD (this manual).

5.1.1 WindObserver 90 Part Numbers.

Available parts are as detailed below:-



Optional Extras:

Item	Part Number
Cable 3 Pair twisted and Shielded wires, 24awg, per metre.	026-02660
Cable 4 Pair twisted and Shielded wires, 24awg, per metre.	026-03156
Cable 9 Pair twisted and Shielded wires, 22awg, per metre.	026-02663
Integrity Check Chamber	1277-00-052
19 way Connector kit	1390-10-163
Base Mount Short	1390-30-154
Base Mount Long	1390-30-155
Pipe Mount	1390-30-156

5.2. Packaging

Whilst the WindObserver 90 is being moved to its installation site, the unit should be kept in its packaging. Retain the packaging for use if the unit has to be moved or returned to Gill Instruments.

5.3. Installation requirements

Host system - One of the following:

- PC with an internal or external interface compatible with the RS422 output from the WindObserver 90.
- Gill WindDisplay.
- Other equipment with I/O compatibility to the WindObserver 90.

  For example if the unit has Digital outputs, a Data Logger, Chart Recorder, or PC.
- Networking - Multiple WindObserver 90 units can be networked

Software - One of the following:

- Gill Wind Software used as a Terminal program only (Wizard and Sync Comms not applicable). Wind will run on PC's up to and including Windows 7 and can be downloaded free from:- http://www.gill.co.uk/main/software.html
- HyperTerminal (supplied with Windows™ 9x to XP).
- Other Terminal Emulation software packages.

Cable and Junction box

To connect between the WindObserver 90 and the host system. The unit is supplied with a base mounted connector system or flying cable options (requiring a mast mounted junction box (not provided)) for onward connection.

If using a flying cable option it must be retained with a cable tie within 150mm of the base of the anemometer.

Mounting Bracket

The WindObserver 90 can be supplied with a short or long base mount to use with a mounting bracket (not provided). The WindObserver 90 can be attached to the bracket via the four tapped holes in the base mount fitted to the unit. Always ensure that the gasket supplied is fitted to the base of the anemometer mount.

It is important that the gasket supplied forms a watertight seal on the base of the anemometer.

In the event that the mounting bracket supplied by the customer is not flat or does not form complete support for the anemometer base; the customer must fit a mounting ring as shown in Figure 2.

Mounting Pole

The WindObserver 90 can be supplied with a pole mount that provides the option to attach to a pole with or without a thread (pole not provided). The WindObserver 90 can be retained to the pole via the three tapped holes in the pole mount fitted to the unit.

5.4. Connector and Cable Assembly.

The WindObserver 90 variant with a connector base is supplied with a mating 19 way connector.

Open the pack of connector parts supplied (Gill Part 1390-10-163).

A set of assembly instructions are supplied with the connector together with:-.

Table of Equivalent Part Numbers		
Part Name	**Gill Part No.**	**Cannon Trident Part No.**
Connector head, 19 way	020-04464	192993-0054
Metal backshell (7 pieces)	020-04465	192993-0084
Solder bucket contacts (5 per pack, (4 –off packs))	020-04469	192900-0635

Arrange Backshell (Gill Part Number 020-04465).

Pass parts 1-6 along the cable as per the diagram below.

(Note that the connector supplies the correct strain relief for cables with an outside diameter of 7.9 to 12.6mm).

Part 7 Part 6 Part 5 Part 4 Part 3 Part 2 Part 1

Prepare Cable (e.g. Gill Part 026-026643).

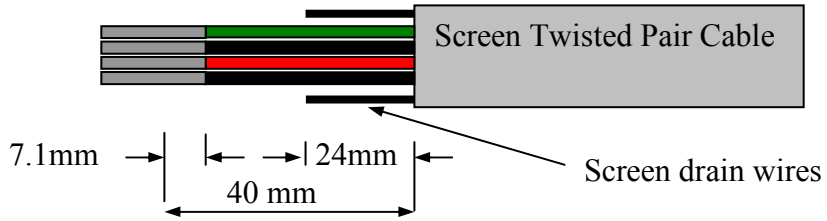
Trim back the cable outer and twisted pair screen sleeves 40mm (see diagram below).

Trim back the screen drain wires to a length of 24mm.

Strip back the connection wires by 7.1mm and tin solder.

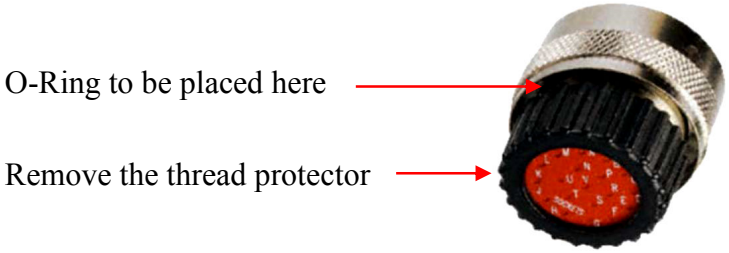
Solder the bucket contacts to the wires.

Unused wires should be cut back and insulated.



Prepare Connector Head (Gill Part 020-04464).

Remove the connector thread protector and place the O-ring (part 7) into the groove of the connector head (020-04464).



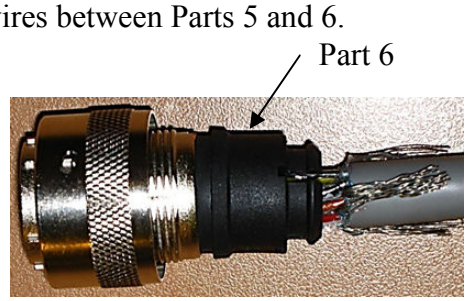
Assemble Connector to the Cable.

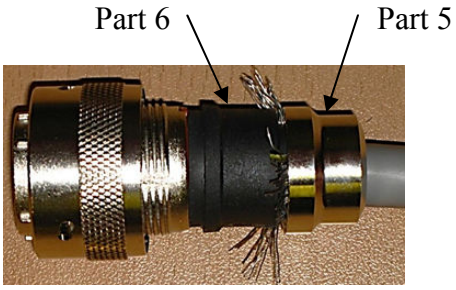
Referring to Page 9 push connector contacts through the red connector head seal into the appropriate location, when in place there should be a click as the contact locks into position.

Once contacts are in position pass part 6 up the cable and into position as shown below.

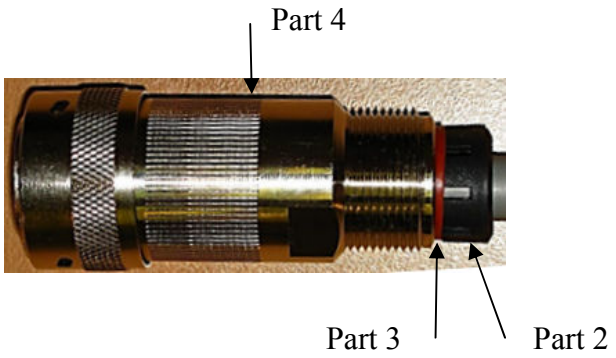
Note: if a connector pin needs removing use Cannon Extraction Tool, Manufacturer's Part 192922-1450.

Fold and spread screen wires over part 6 and then push up part 5 as shown to clamp screen wires between Parts 5 and 6.



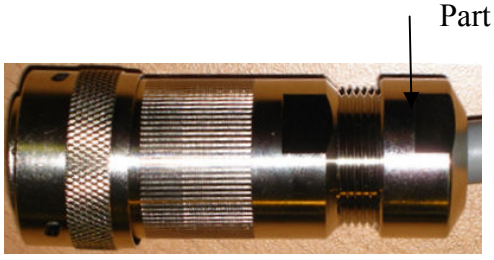


Now screw in part 4 and torque up to a value of 10Nm.



Pass parts 3 and 2, the cable seal and cable grip from the connector kit, along the cable to the housing.

Now screw in item 1, the clamp nut, over parts 2 and 3 and onto the housing and torque up to a value of 10Nm.



6. INSTALLATION

Do NOT remove the black "rubber" transducer caps. Warranty is void if the Red security seal is damaged or removed.

Take care not to knock the four Transducer arms. All the time the WindObserver 90 is not in its final location, it should be protected from damage by keeping it in the original packaging as long as possible, treating it as a delicate instrument.

If an Intrinsically Safe (IS) device is required, the I.S. WindObserver must be used - the WindObserver 90 is NOT an IS device.

6.1. Installation Guidelines

The WindObserver 90 has been designed to meet and exceed the stringent standards listed in its specification. Operating in diverse environments all over the world, WindObserver 90 requires no calibration or adjustment whatsoever.

As with any sophisticated electronics, good engineering practice should be followed to ensure correct operation.

- Always check the installation to ensure the WindObserver 90 is not affected by other equipment operating locally, which may not conform to current standards, e.g. radio/radar transmitters, boat engines, generators etc.

  Guidelines –

  - Avoid mounting in the plane of any radar scanner – a vertical separation of at least 2m should be achieved.
  - Radio transmitting antennas, the following minimum separations (all round) are suggested.
    - VHF IMM – 1m
    - MF/HF – 5m
    - Satcom – 5m (avoid likely lines of sight)
- Ensure the product is correctly earthed in accordance with this manual.
- Use cables recommended by Gill, keeping the length below the maximum allowed (*See Section 6.3*) Where the cables are cut and re-connected (junction boxes, plugs and sockets) the cable screen integrity must be maintained, to prevent the EMC performance being compromised.
- Earth loops should not be created – earth the system in accordance with the installation guidelines. (*See Section 6.5*)
- Ensure the power supply operates to the WindObserver 90 specification at all times.

Avoid turbulence caused by surrounding structures that will affect the accuracy of the WindObserver 90 such as trees, masts and buildings. The World Meteorological Organisation makes the following recommendation:

- The standard exposure of wind instruments over level open terrain is 10m above the ground. Open terrain is defined as an area where the distance between the sensor and any obstruction is at least 10 times the height of the obstruction.

When installing the unit degrease the unit and hold with lint free gloves to reduce the build-up of deposits.

6.2. Bench system test

***Note**: Prior to physically mounting the WindObserver 90 in its final location, we strongly recommend that a bench system test be carried out to confirm the system is configured correctly, is fully functional and electrically compatible with the selected host system and cabling (preferably utilising the final cable length). The required data format, units, output rate, and other options should also all be configured at this stage. If an Integrity Check Chamber (ICC) has been purchased refer to Section 9.6.*

6.3. Cabling

Cable type

An RS422 compatible cable should be used, with the number of twisted pairs matching the application.

Generic description – Twisted pairs with drain wire, screened with aluminised tape, with an overall PVC sheath. Wire size 7/0.2mm (22 or 24 AWG)

The table shows some suitable manufacturers' references; other manufacturer's equivalents can be used.

Table 1

No. of pairs	Gill ref.	Belden ref.	Batt electronics ref.
2	-	9729	91071
3	026-02660	9730	91030
4	026-03156	9728	91199
6	-	8778	91011
9	026-02663	8774	91009

Cable length

The typical maximum length at 9600 baud is 1km (3200ft), using the recommended cable. If any problems of data corruption are experienced (due to, for example, a high local electrical 'noise' level), then a lower baud rate should be used. Alternatively, a thicker or higher specification cable can be tried. If longer cables are used than supplied then consideration should be given to powering the Heater using lower gauge wire or paralleling wires to avoid volt drops.

Cabling and junction box

If the WindObserver 90 unit is fitted with a flying 9 pair cable attached, this must be terminated in a suitable terminal box to IP66 or better, fitted with glands to prevent moisture ingress.

The cable type from the terminal box to the host system must be as specified above. If any cable is likely to be exposed to mechanical damage, it must be enclosed in a suitable conduit or cable tray. The cable must be securely fixed with cable clamps or equivalent at regular intervals such that the WindObserver 90 cable gland does not support the cable weight.

For units with a cable gland at the base of the WindObserver 90 it **should not** be directly exposed to moisture, as the anemometer is vented to air at the base to avoid pressure build up. If an IP66 rating is essential or the unit is mounted other than 'right way up' **use the gasket** provided in the mounting kit.

6.4. Power supplies

WindObserver 90 units

Sensor Supply: -

Voltage	9v to 30v DC
Current	50mA average, 60mA max.

- The WindObserver 90 has reverse polarity protection.

WindObserver 90 Heating Option

Heater Supply: -

Voltage	24V ± 15% AC RMS or 24V DC ± 10%.
Current	allow for 7A.

- **The AC Supply must be isolated from Mains Supply.**
- The heating module requires a separate power supply.
- Heater Cable length should be minimised to avoid cable volt drops and ensure maximum voltage received at the Anemometer.
- All three heater pair cables must be used, connect yellow, brown and orange wires to heater positive and their respective black wires to heater negative.
- The heating (H command) is H2 as a default condition. If heating is not required enabled then the H command must be set for H1.

The WindObserver 90 has reverse polarity protection.

WARNING NOTE:-

When heating is activated the bullet and transducer arms will get very hot and should not be handled.

6.5. Connections

Important: Any cable wires not used should be isolated and grounded at the terminating equipment/user end.

Do NOT connect the unit's 0V, heating –ve, or digital 0V to the screen or earth.

On units with integral cable the screens of each pair are joined together inside the anemometer - these should be joined to the cable screen(s) of any further cable run. Avoid long grounding loops. Digital OV should be used in conjunction with RS422 TX RX lines in order to improve noise immunity.

Earthing or grounding

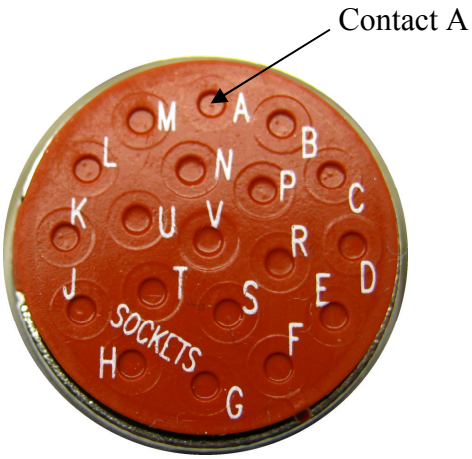
To ensure correct operation, and for maximum protection against lightning, the anemometer **MUST** be correctly earthed (grounded) via its mountings. Inadequate Earthing will degrade anemometer performance, particularly in the presence of radio frequency interference.

See Fig 1 ***Suggested mounting bracket and Earthing (grounding) arrangements***

The unit **MUST** be connected to an appropriate grounding point with a minimum of 6mm² copper wire, via the M5 base screws. The cable screens must be joined with any cable screen continuing from the unit's cable via a junction box. The primary earth for the anemometer must be provided via the base screws and not via the cable screens.

View of the WindObserver 90 base connector variant

Supplied Plug



Anemometer Socket

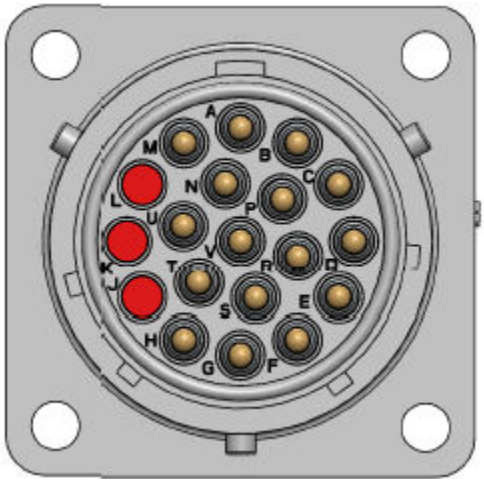


Table 2 - 19 way connector and cable connections

19 Way Connector Terminal Letter	Cable Gland Option		Signal Designation
	Conductor	Colour	
P	Pair 1	Green	RS422 TXB (+)
C	Pair 1	Black	RS422 TXA (-)
U	Pair 2	White	RS422 RXB (+)
V	Pair 2	Black	RS422 (RXA (-)
R	Pair 3	Red	Supply V+
D	Pair 3	Black	Supply V -
M	Pair 4	Blue	Digital 0v
N	Pair 4	Black	Not Used (Isolate)
A	Pair 5	Yellow	Heater +
B	Pair 5	Black	Heater -
H	Pair 6	Brown	Heater +
G	Pair 6	Black	Heater -
E	Pair 7	Orange	Heater +
F	Pair 7	Black	Heater -
T No Connection	Pair 8	White	Not Used (Isolate)
S No Connection	Pair 8	Red	Not Used (Isolate)
L No Connection	Pair 9	Green	Not Used (Isolate)
K No Connection	Pair 9	Red	Not Used (Isolate)
J No Connection	Not Applicable	Not Applicable	Not Used

Default Settings

The factory default settings are:

Unheated Unit.

A0 B3 C1 E1 F1 G0000 J1 K1 L1 M2 NA O1 P1 T1 U1 V1 X1 Y1 Z1

Heated Unit.

A0 B3 C1 E1 F1 G0000 H2 J1 K1 L1 M2 NA O1 P1 T1 U1 V1 X1 Y1 Z1

Note that the Heating (H Command) is enabled as a default condition. If heating is not required then the H command must be set for H1.

See Section 8 Configuring for further details.

Connecting to a PC with a RS422 or RS485 input

The PC requires either an internal RS422 interface card, or an external RS422/485 to RS232 or USB converter, to plug into the PC or host equipment.

WindObserver 90				Converter, PC, or Logger
Signal Names	19 Way Connector	Cable Gland		RS422/RS485
	Pin No.	Pair No	Colour	Signal Names
TXB (+)	P	1	Green	RXB (+)
TXA (-)	C	1	Black	RXA (-)
RXB (+)	U	2	White	TXA (+)
RXA (-)	V	2	Black	TXB (-)
Digital 0v	M	4	Blue	Signal Ground
Connected Internally				Ground Earth
Sensor +	R	3	Red	+ve DC
Sensor -	D	3	Black	-ve PSU *
Heater +	A	5	Yellow	+ Heater Power Supply *
Heater +	H	6	Brown	
Heater +	E	7	Orange	
Heater -	B	5	Black	-
Heater -	G	6	Black	
Heater -	F	7	Black	

*…For Power Supply Information see Section 6.4.

Note:-

The 3 heater +ve wires should be connected in Parallel, as too should the return 3 Heater -ve wires.

Networking units

Before coupling units into a network:

- Each device must be configured with a unique Unit Identifier (letter A to Z) however in multi drop systems it could be advised to avoid using letters A-F, K,M,N and P as they could appear in the data string.
- Unit must be set for half duplex mode (E2 setting) see Para 7.3).
- It must be configured to a tri-state polled mode M3 or M4.

See also Section 8 – Configuring

WindObserver 90				Converter, PC, or Logger
Signal Names	19 Way Connector	Cable Gland		RS485 2 wire
	Pin No.	Pair No	Colour	Signal Names
TXB (+)	P	1	Green	
RXB (+)	U	2	White	T/RXB (+)
TXA (-)	C	1	Black	T/RXA (-)
RXA (-)	V	2	Black	
Digital 0v	M	4	Blue	Signal Ground
Connected Internally				Ground Earth
Sensor +	R	3	Red	+ve DC
Sensor -	D	3	Black	-ve PSU *
Heater +	A	5	Yellow	+
Heater +	H	6	Brown	
Heater +	E	7	Orange	Heater Power Supply *
Heater -	B	5	Black	-
Heater -	G	6	Black	
Heater -	F	7	Black	

To Next Unit

*For Power Supply Information see Section 6.4.

Notes:-

Heater Pair wires Yellow, Brown and Orange should be connected in Parallel, as too should the return 3 Black wires.

6.6. Indoor Power and Communications Interface (Part 1189-PK-021)

The desktop PCI is intended for use in a protected environment and provides interfacing and power to a single anemometer (Note a separate supply is required for heating).

The PCI is not intended for outdoor use.

Note a mains connector lead only is supplied with the PCI Box.

Connecting to a PCI Unit with RS422 input

WindObserver 90				PCI Box	
Signal Names	19 Way Connector	Cable Gland		15 Way D Type Connector	
	Pin No.	Pair No	Colour	Pin No.	Signal Name
TXB (+)	P	1	Green	2	RXB (+)
TXA (-)	C	1	Black	9	RXA (-)
RXB (+)	U	2	White	3	TXB (+)
RXA (-)	V	2	Black	10	TXA (-)
Digital 0v	M	4	Blue	4	Signal Ground
Sensor +	R	3	Red	5	Power V+
Sensor -	D	3	Black	11	Power 0v

To Connect the PCI RS232 Output (9 Pin D Type connector) to a PC RS232 9 way port to communicate with the sensor connect as follows:-.

PCI RS232 Output		PC RS232 Input
Pin 2	→	Pin 2
Pin 3	←	Pin 3
Pin 5 Gnd	—	Pin 5 Gnd

Environmental

PCI Electrical Power Requirements

1) 100Vac – 120Vac, 10VA for the 115V switch position
2) 200 Vac – 250Vac, 10VA for the 230V switch position
3) 20-30Vdc, 120mA max (anemometer)
   8-15Vdc, 50mA max (interface)

3 Fuses protect the unit:

1. Externally accessible 315mA(T) for 115/230v operation
2. Internally accessible 500mA (T) AUX
3. Internally accessible 500mA (T) ANEM

PCI Connector Pin and Cable assignments

Anemometer connector – 15 way skt

Pin	Designation	(Example Plug MH Connectors MHDM15-DM15P-K)
1	Chassis	(e.g. RS Components 765-9494)
2	RS422_RXB (+)	
3	RS422_TXB (+)	
4	Digital 0V, Signal ground	
5	Supply V+	
6	Not Used	
7	Not used	
8	Not Used	
9	RS422_RXA (-)	
10	RS422_TXA (-)	
11	Supply V-	
12	Not Used	
13	Not Used	
14	Not used	
15	Not Used	

Auxiliary Analogue Outputs – 9 way (Not Applicable)

DC Supply – 4 way

Pin	Designation	Example Connector Amphenol CO91A
1	Interface V+	(e.g. T3301001)
2	Interface V-	
3	Anemometer V-	
4	Anemometer V+	

RS 232 Output – 9 way Skt

Pin	Designation	(Example Plug MH Connectors MHDM9-DM9P-K)
1	DCD	(e.g. RS Components 765-9485)
2	RX data	
3	TX data	
4	DTR	
5	Signal Ground	
6	DSR	
7	RTS	
8	CTS	
9	RI	

RS422 Network In – 9 way Skt

Pin	Designation	(Example Plug MH Connectors MHDM9-DM9P-K)
1	Not connected	(e.g. RS Components 765-9485)
2	Not connected	
3	Not connected	
4	RS422_RXA (-)	
5	Signal ground	
6	RS422_TXA (-)	
7	RS422_TXB (+)	
8	RS422_RXB (+)	
9	Chassis	

RS422 Network Out – 9 way Plg

Pin	Designation	(Example MH Connectors MHDM9-DM9S-K)
1	Not connected	(e.g. RS Components 765-9488)
2	Not connected	
3	Not connected	
4	RS422_RXA (-)	
5	Signal ground	
6	RS422_TXA (-)	
7	RS422_TXB (+)	
8	RS422_RXB (+)	
9	Chassis	

6.7. Using the WindObserver 90 with the Gill WindDisplay

The WindObserver 90 is designed to interface with the Gill WindDisplay unit to provide a complete wind speed and direction system. To interface to a non NMEA WindDisplay the WindObserver is set for Polar (M2) and 9600 (B3) configuration settings.

When coupled to a WindDisplay, the WindObserver 90 can be used as supplied, however if a fault occurs the WindDisplay may lock into the last valid reading. Re-configuring the WindObserver 90 to Fixed Field output (O2) will ensure that any fault is flagged on the WindDisplay.

After coupling to a WindDisplay, the Wind Speed units and the Averaging period can be selected using the WindDisplay controls. *See the WindDisplay User Manual*.

Note that although the WindDisplay can display wind speed in various units, these are calculated within the WindDisplay. The data coming to the WindDisplay **must** be in metres/sec (the factory default output setting).

Figure 3 WindDisplays

Meteorological Display

Marine Display

NOTES:-

If the WindDisplay is configured for NMEA mode then the WindObserver 90 must also be configured for NMEA mode and 4800-baud operation (configuration settings M5 and B2).

If required the WindDisplay can provide power for the sensor circuitry but not power for the heater circuitry.

Units set for Averaging Mode 15 will not be compatible with the WindDisplay input requirements.

Connecting to a Gill WindDisplay

Refer to the WindDisplay User Manual for the method of operation.

WindObserver 90				WindDisplay	
Signal Names	19 Way Connector	Cable Gland			
	Pin No.	Pair No	Colour	Signal Names	Terminal
TXB (+)	P	1	Green	RS422 +	8
TXA (-)	C	1	Black	RS422 -	7
Connected Internally				Ground Earth	
Sensor +	R	3	Red	Supply +	2
Sensor -	D	3	Black	Supply 0	1

Heater +	A	5	Yellow	+ve
Heater +	H	6	Brown	
Heater +	E	7	Orange	
				Heater Power Supply*
Heater -	B	5	Black	
Heater -	G	6	Black	- ve
Heater -	F	7	Black	

*…For Power Supply Information see Section 6.4.

Notes:-

Heater Pair wires Yellow, Brown and Orange should be connected in Parallel as to should the return 3 Black wires.

Heating (H2 command) is enabled as a default condition. If heating is not required enabled then the H command must be set for H1.

See Section 8, Configuring for further details.

6.8. Mechanical installation

Do NOT remove the black "rubber" transducer caps. Warranty is void if the Green security seal is damaged or removed.

Take care not to knock the four Transducer arms.

Before installing, a bench system test is recommended.

All the time the WindObserver 90 is not in its final location, it should be protected from damage by keeping it in the original packaging as long as possible, treating it as a delicate instrument.

When installing the unit handle with lint free gloves and degrease the unit to reduce the build-up of deposits.

Do not apply clamps to the WindObserver cylinder body as this will distort the cylinder and affect sealing.

Location

It is important to ensure that the WindObserver 90 is mounted in a position clear of any structure, which may obstruct the airflow or induce turbulence.

Do NOT mount the WindObserver 90 in close proximity of high-powered radar or radio transmitters. A site survey may be required if there is any doubt about the strength of external electrical noise. (*See Section 6.1)*

Orientation

Normally the WindObserver 90 is mounted vertically with the cable exit at the bottom.

Alternatively, the unit may be mounted in any orientation, but note that if the unit is mounted with the cable uppermost, the gasket provided in the mounting kit **must** be used or unit base sealed externally to prevent water penetration.

Mounting (Short and Long Mounts)

A suggested mounting bracket using Short or Long base mounts is shown in Fig 1.

It is recommended that the WindObserver 90 mounting bracket be manufactured from stainless steel 316, to prevent possible galvanic corrosion.

It is also recommended that the supplied gasket be always fitted to ensure IP66 rating and to prevent galvanic corrosion if the mounting bracket is not manufactured from stainless steel 316.

Stainless steel 316 fixings must be used.

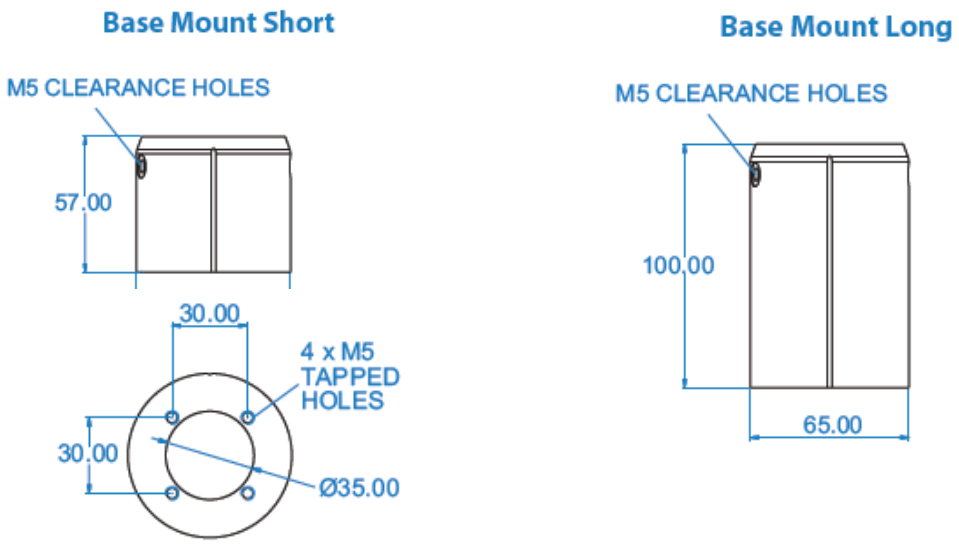


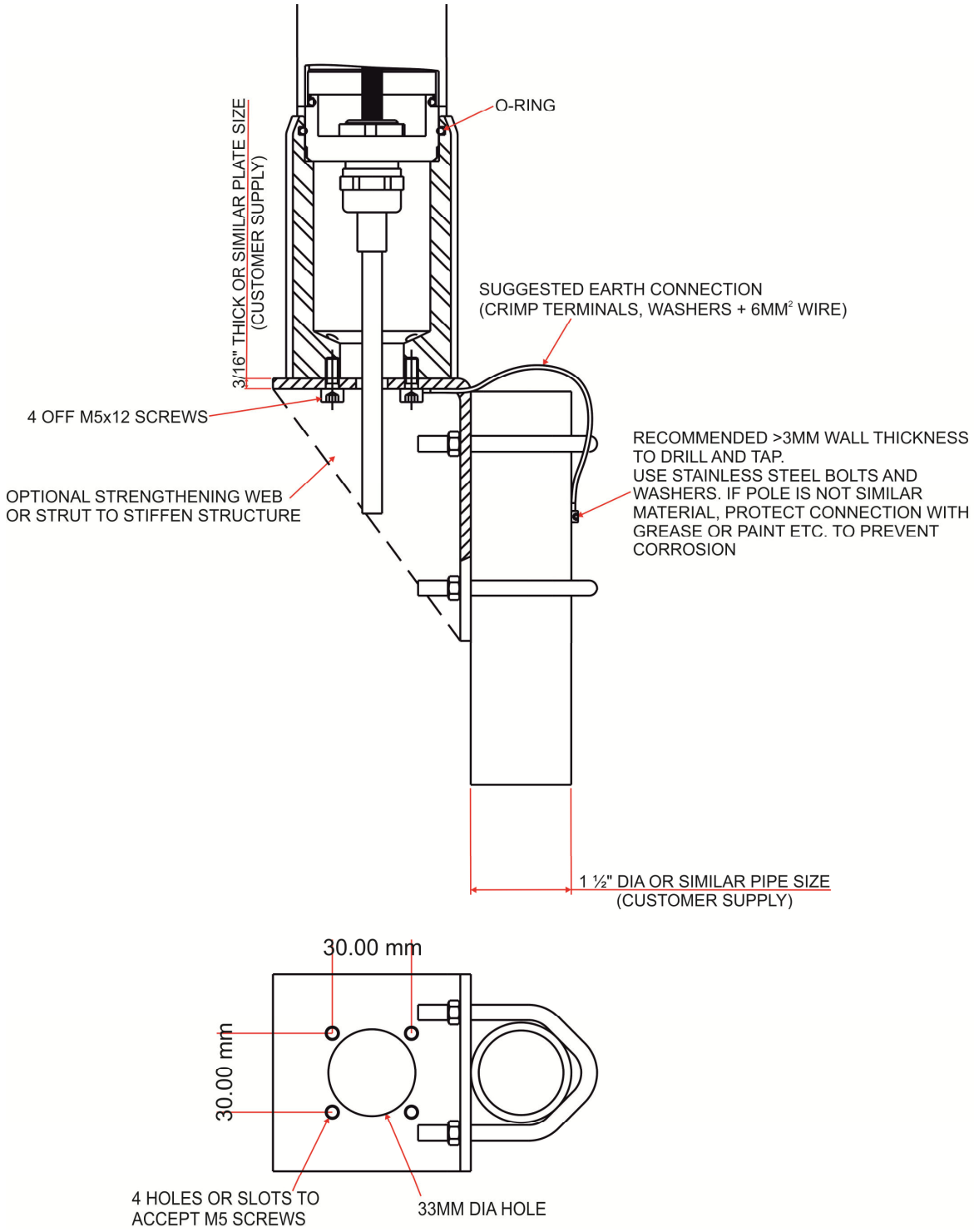
Figure 1. Suggested Mounting Bracket and Earthing (Grounding) Arrangement.

The example shows a long mount fitted to a cable gland unit, a similar Earthing/ mounting arrangement can be used with short mounts and connector based units.

A mounting kit is supplied with the WindObserver 90 to allow assembly of the mount to the base of the WindObserver.

Included in the supplied mounting kit is an O Ring Seal which must be fitted inside of the Base Mount.

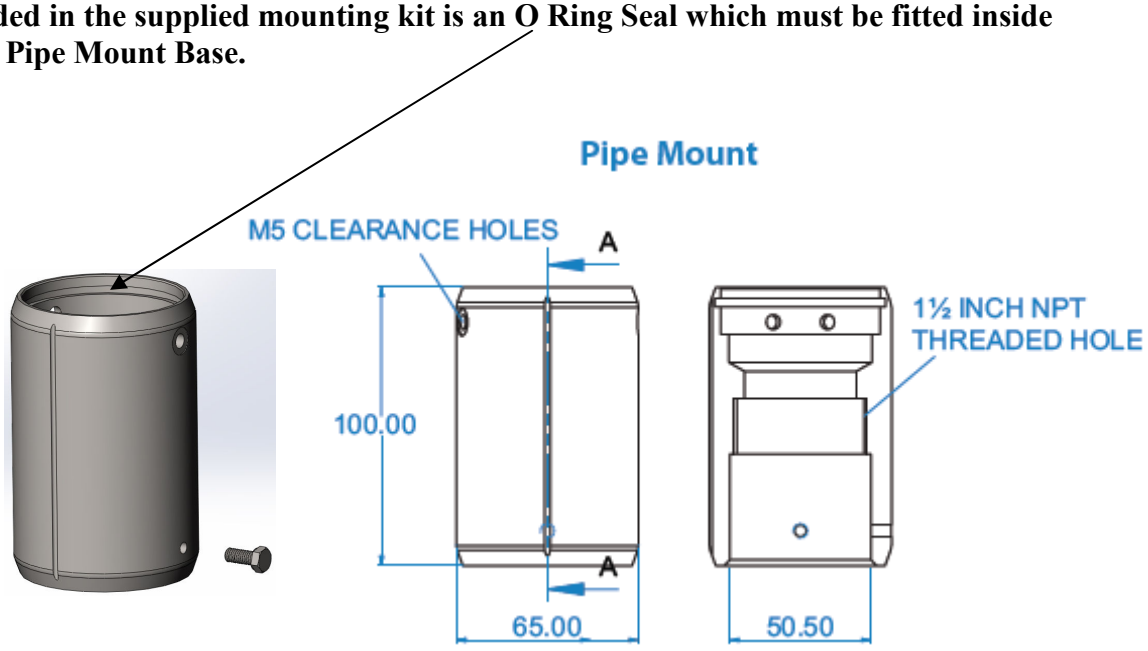
When assembling the 4 off M5x12 mount screws first fit a wavy washer, then a flat washer, then the seal washer before screwing to the WindObserver Base mount.



Pipe Mounting (use with Pipe Mount)

The Pipe Mount base for the WindObserver 90 has the following dimensions.

Included in the supplied mounting kit is an O Ring Seal which must be fitted inside of the Pipe Mount Base.



The mounting pole dimension should be 50mm (1.97”) diameter.

Three M5 x 12 hex screws are provided to secure the Pipe Mount to the WindObserver base.

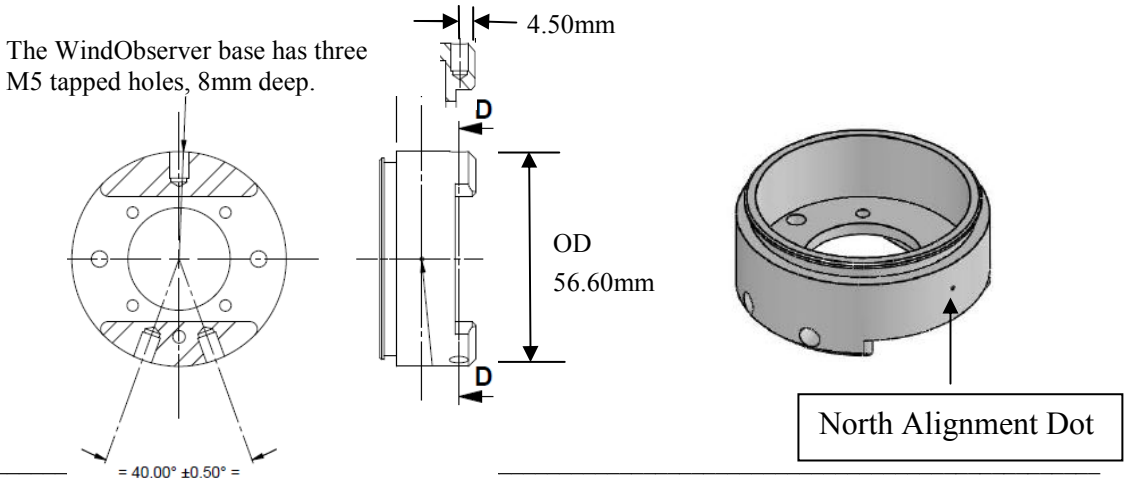
Three M5 x 12 hex screws to secure the Pipe Mount to the pipe through M5 tapped holes in the pipe mount.

If a screw threaded pole is used it should be a 1.5 inch National Pipe Thread (NPT) type.

It is recommended that the WindObserver mounting pole be manufactured from Stainless Steel 316, to prevent possible galvanic corrosion.

Custom Mount (Use with WindObserver No Mount Option)

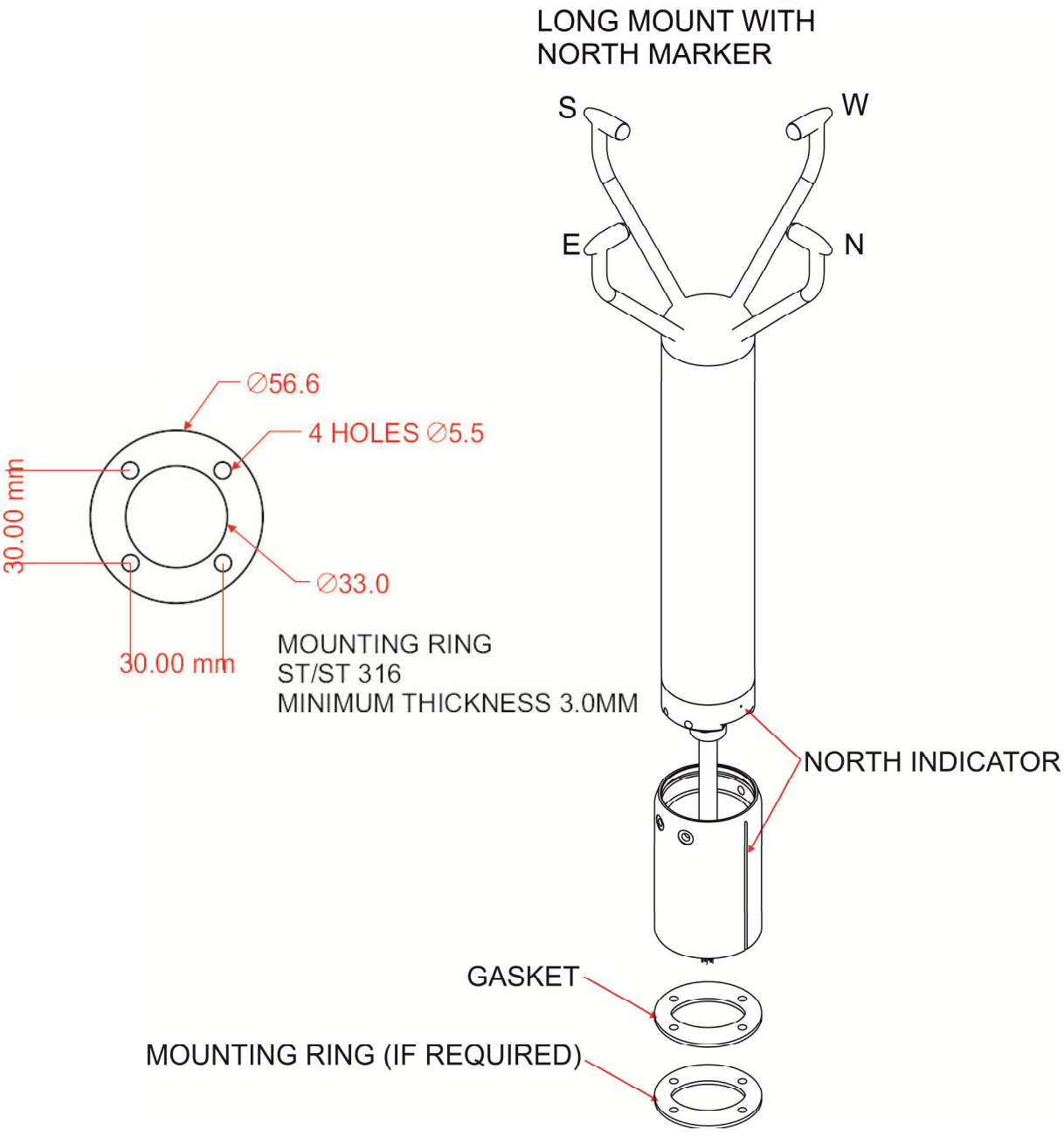
Although it is recommended that customers select a base mount option from Gill Instruments, should a customer wish to design their own mount then the WindObserver base dimension details for this are as follows:-



Alignment

The anemometer should be set to point North (or to another known reference direction), using the North Spar, which can be identified from red dot alignment indicator on the base of the instrument and vertical groove on short base, long base or pipe mount adaptor. *See Figure 2a*.

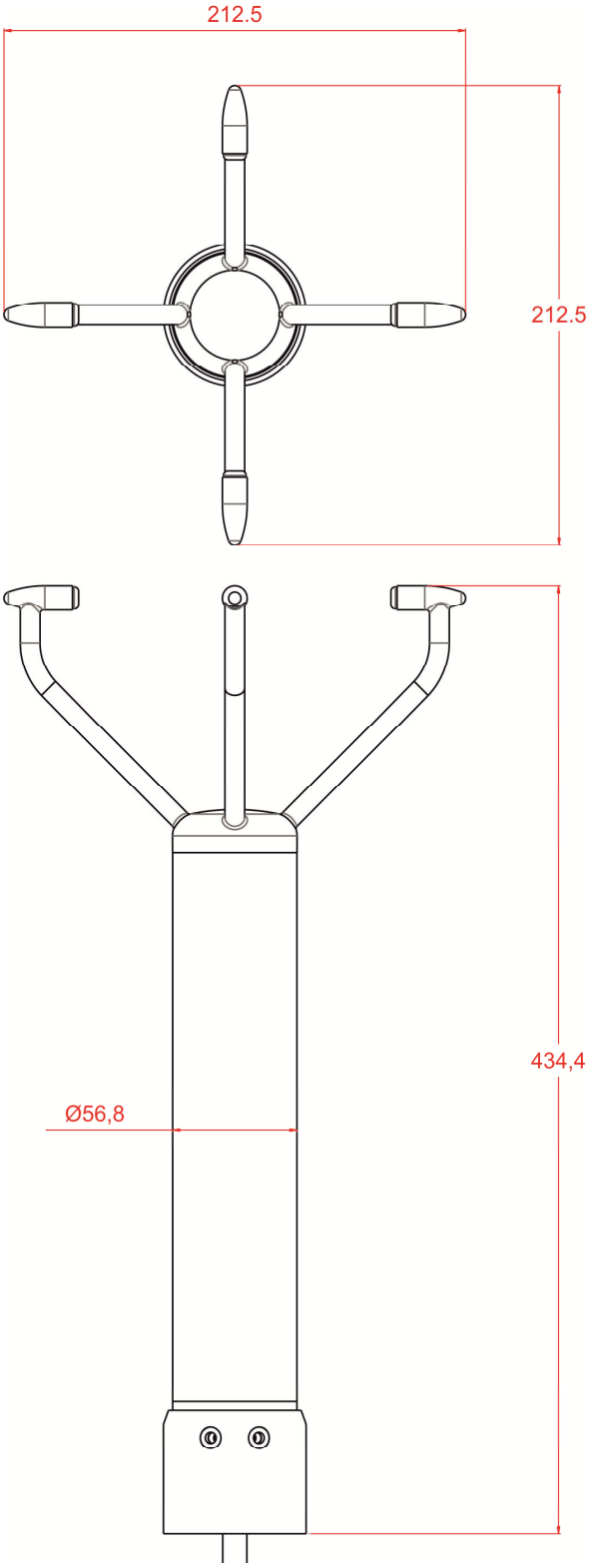
Figure 2a North Marker (Long Base Mount shown for illustrative purposes).



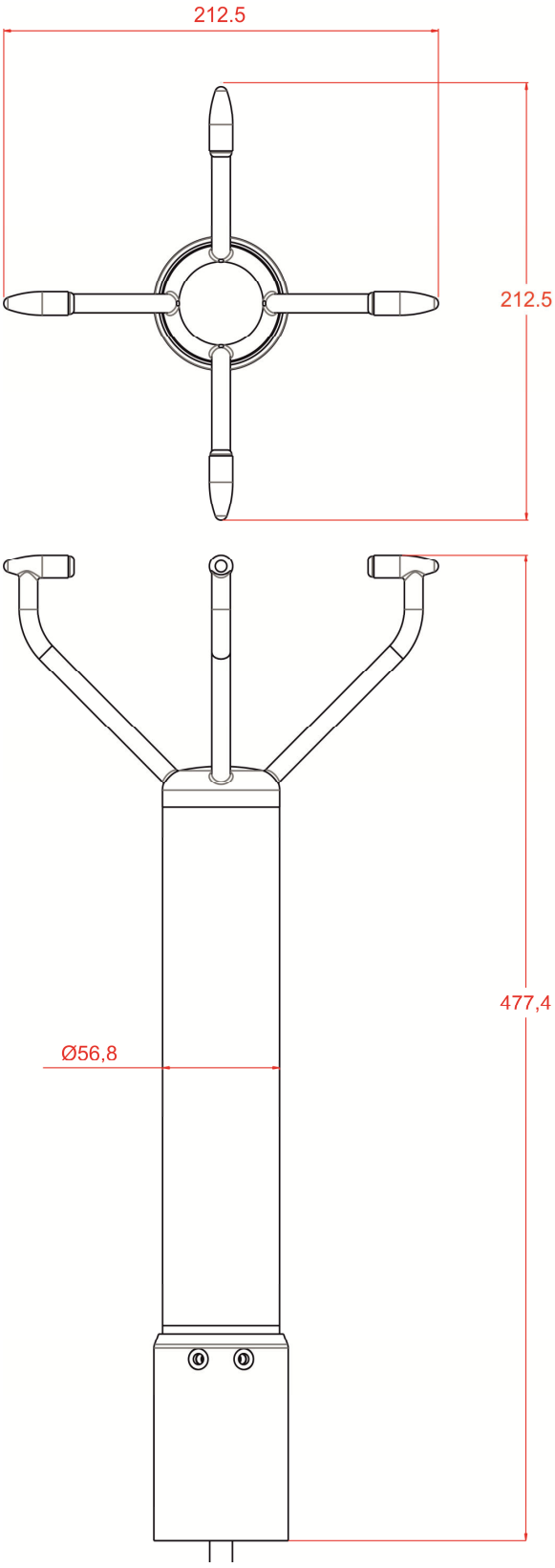
Pipe Mount units do not require the gasket and mounting ring.

Figures 2b WindObserver 90 Outline Dimensions with Mounts

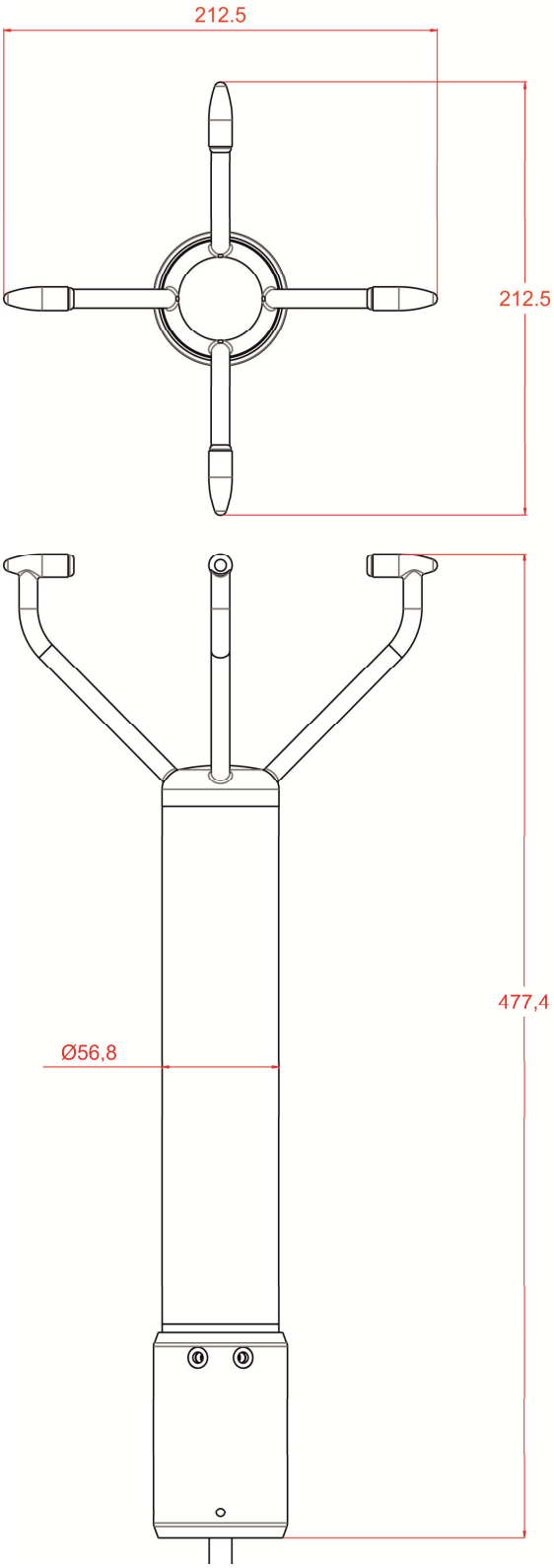
Short Base Mount Unit Dimensions



Long Base Mount Unit Dimensions



Pipe Mount Unit Dimensions



7. MESSAGE FORMATS & OPTIONS

On first applying power to the WindObserver 90, it will be in 'Measurement Mode', and it will output wind measurement information in one of the formats as described below.

Setting the output format, units, other parameters, options and the communication settings are all carried out in the alternative 'Configuration Mode'.

See Section8 CONFIGURING for details of how this is done.

The factory default settings are shown here in **bold***, and for convenience some 'Configuration codes' (as used to set the configuration) are shown in blue boxes. For example* M3.

7.1. Wind Speed format

The wind speed measurements can be output in one of the following formats:
UV, Polar or NMEA.

7.2. Output formats

The UV and Polar wind speed parameters are output in ASCII.

These parameters can be transmitted continuously or polled from the user.

Polar is also available in continuous NMEA format.

Output Formats Table

Output format	Output	Tri-state o/p	Configuration code
ASCII UV	Continuous	No	M1
	Polled	Yes	M3
ASCII Polar	**Continuous**	**No**	**M2**
	Polled	Yes	M4
NMEA	Continuous	No	M5
ASCII Polar	Continuous Averaged	No	M15
ASCII Polar	Polled Averaged	Yes	M14

Low wind speeds

Whilst the wind speed is below 0.05 metres/sec, the wind direction will not be calculated, and the last known good direction figure is shown. All other output parameters will continue to update at the output rate.

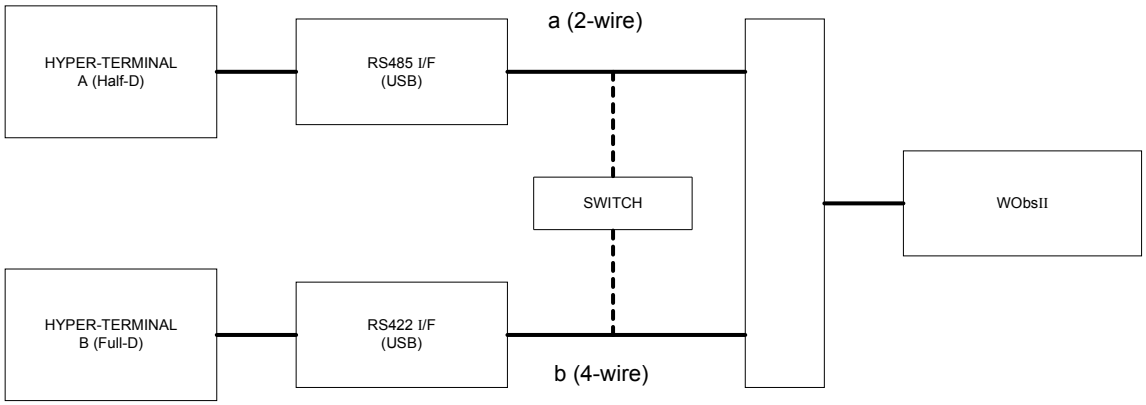
7.3. Networking

Gill Proprietary Network

Each anemometer connected to the network **MUST** be given a unique Unit Identifier (Letters A to Z), and set to a polled tri-state mode (UV or Polar) (M3 or M4).
In these modes the communications transmit line is tri-state unless the anemometer is responding to a command. If used in a multi drop system then it is recommended that Unit Identifiers A, B, C, D, E, F, K, M, N and P are not used.

Configuring WindObserver 90 for Half Duplex Operation.

1) Set up Two Terminals: One for RS485 Half Duplex and the other for RS422 Full Duplex.



One PC (with two USB ports) can be used for both Terminals, although two may be less confusing.

Note: Power must not be disconnected from the anemometer throughout this procedure.

2) Assuming the unit is set for Full Duplex, connect 9-way at [b] disconnect 9-way at [a]. Set Switch to position [b] (4 wire).
3) On Terminal B, enter CONFIGURATION MODE. Set Half Duplex (E2). The CONFIRM> prompt will appear.
4) Disconnect 9-way [b] and connect 9-way [a]. Set Switch to position [a] (2 wire).
5) On Terminal A, type “E” <ENTER> to confirm.
6) The unit should now be configured in Half Duplex mode.

Configuring WindObserver 90 for Full Duplex Operation.

1) Assuming the unit is set for Half Duplex, disconnect 9-way [b] and connect 9-way [a]. Set Switch to position [a] (2 wire).
2) On Terminal A, type “E1” to select Full Duplex. The CONFIRM> prompt will appear.
3) Disconnect 9-way [a] and connect 9-way [b]. Set Switch to position [b] (4 wire).
4) On Terminal B type “E” <ENTER> to confirm.

7.4. Units

The wind speed can be set to any of the following units:

Unit	Abbreviation
Metres per sec	m/s
Knots	knots
Miles per hour	MPH
Kilometres per hour	kph
Feet per minute	fpm

7.5. Output rate

The output frequency is 1 reading per second. The wind speed is sampled every 25ms, each axis being sampled sequentially. The following Table lists the output per second and the corresponding number of averaged samples. A 25ms sample period is used to process and output the results.

Outputs per Second	Sample Average
1	39

7.6. Averaging (Digital Data)

There are two digital averaging options:-

7.6.1 G Command Averaging.

Using the G Command in association with modes other than M14, M15 and polled modes.

The Averaging Period can be set from zero to 3600 secs. (1 hour). The default setting is zero**.** When averaging is enabled, data is output at a rate determined by the averaging period. The data is an average of valid data collected during the averaging period.

If G is set to zero then averaging settings will be disabled.

For instance if the unit is set for G0025 then every 25 seconds there will be a single result output that provides the average of the wind direction and magnitude data over the last 25 seconds.

A,219,000.78,M,60,└ 0D
A,202,000.79,M,60,└ 06
A,207,001.22,M,60,└ 0C
A,220,000.48,M,60,└ 04

7.6.2 Modes 14 and 15 Road Weather Averaging (RWA).

The averaging is implemented with reference to the following standard:

- Guide to Meteorological Instruments and Methods of Observation – World Meterological Organization WMO-No8 seventh edition 2008 ISBN 978-92-63-10008-S

The direction and magnitude outputs are derived from the vector sum of U and V over the RWALONG averaging period (default 10 minutes in P1).

The gust output is derived from the vector sum of U and V over 3 readings (3 seconds in P1), and the max gust is the maximum of the gust value over the RWASHORT period (default 60 seconds in P1). The max gust value is reset to zero at the end of each RWASHORT period.

Mode 15 – Averaging Data in Continuous mode.

Averaged Digital Data Output comprises of.

<Start of String>, Node, Mode, Averaged Direction, Averaged Magnitude, units, Maximum Gust Direction, Maximum Gust Magnitude, Status, <End of String>, checksum

e.g.

```
0A,M15,293,000.03,M,338,000.05,51,♥47
```

(status code 51 shows measurement average building, non-heat enabled units only).

```
0A,M15,198,000.04,M,088,000.39,00,♥4B
```

(status code 00 code shows measurement average building period complete and normal operation, non-heat enabled units only).

Principle set up commands associated with this averaging mode are:-

Px:- Measurement Rate, (P1) this command sets the underlying measurement rate 1Hz.

RWASHORT xx: - Short Term Number, where xx is a number from 10 to 60.

RWALONG xx: - Long Term Number, where xx is a number from 1 to 10.

The Averaged Data Output period in seconds is:-

$$\frac{\text{RWASHORT Number}}{\text{Measurement Rate (P Setting Hz value)}}$$

Therefore with the RWASHORT number set for 60 (default) and P command set for 1Hz (P1 default) the unit will output a rolling averaged reading every 60 seconds.

The Averaged Direction and Magnitude reading is based on:-

RWALONG Number * Averaged Data Output period.

Therefore if the RWALONG number is 10 (default) and Averaged Data Output Period is 60 seconds, then the rolling averaged Direction and Magnitude data is calculated over rolling 600 readings.

```
aA,M15,293,000.03,M,338,000.05,51,47
aA,M15,301,000.03,M,304,000.04,51,43
aA,M15,299,000.03,M,285,000.02,51,4D
aA,M15,303,000.02,M,336,000.02,51,47
aA,M15,291,000.03,M,200,000.64,51,48
aA,M15,291,000.02,M,301,000.03,51,48
aA,M15,243,000.04,M,172,001.52,51,42
aA,M15,236,000.03,M,090,000.08,51,44
aA,M15,243,000.03,M,099,000.09,51,4E
aA,M15,198,000.04,M,088,000.39,00,4B
aA,M15,180,000.04,M,099,000.09,00,41
aA,M15,180,000.03,M,345,000.03,00,4E
```

The Maximum Gust Direction is the direction of the maximum gust measured over the short term output period. Gust is generated from a rolling 3s average of the short term output period, and reset at the end of short term output period.

The maximum Gust Magnitude is the magnitude of the maximum gust measured over the short term output period. Gust is generated from a rolling 3s average of the short term output period, and reset at the end of short term output period.

Notes:-

Non Heat Enabled Units - Whenever the unit is powered up then until the unit has reached its minimum long term averaging interval the status code will read 51 (Measurement Average Building).

Heat Enabled Units - On units where heat is enabled Code 51 will not be output during the measurement average building period, therefore allow for this period on power up before taking readings to be fully averaged (maximum period of 10 minutes).

The G Command setting has no effect on Mode 14 and Mode 15 Settings.

Mode 14 – Averaging Polled Mode

See Mode 15 for data output format and command explanations.

For ease of use before changing to this Mode set all other WindObserver parameters first including:-

Px:- Measurement Rate, (P1) this command sets the underlying measurement rate of 1Hz.

RWASHORT xx: - Short Term Number, where xx is a number from 10 to 60.

RWALONG xx: - Long Term Number, where xx is a number from 1 to 10.

Once set for Mode 14, to Poll for averaged data use the ? command followed by the unit designator A (default setting, ensure capitol letter used).

The polled mode commands available in this mode are:

Description	Command	WindObserver response
Enable Polled Mode	?	(None)
WindObserver Unit Identifier (N)	A…….Z	Output generated
Disable Polled mode	!	(None)
Request WindObserver Unit Identifier	&	A ….. Z (as configured)
Enter Configuration mode	*<N>	CONFIGURATION MODE

Where <N> is the unit identifier, if used in a multi-drop system then it is recommended that ID's A to F and KMNP are not used as these characters can be present in the data string.

It is suggested that in polled mode the following sequence is used for every poll for information.

? Ensures that the Sensor is enabled to cover the event that a power down has occurred.

A-Z Appropriate unit designator (capitol letter) sent to retrieve a line of data.

! Sent to disable poll mode and reduce possibility of erroneous poll generation.

When polled with the default Mode 14 factory setting the WindObserver (set for default 1Hz output) will output the last valid 10 minute wind speed and direction average, updated every minute along with last valid 1 minute Gust magnitude.

Notes

Non Heat Enabled Units.

If the unit is powered up and polled before the unit has reached its minimum averaging interval the status code will read 51 (Measurement Average Building, non heat enabled units only).

Heat Enabled Units.

On units where heat is enabled Code 51 will not be output if polled during the measurement average building period, therefore allow for this period on power up before taking readings to be fully averaged (maximum period of 10 minutes).

```
aA,M15,293,000.03,M,338,000.05,51,47
aA,M15,301,000.03,M,304,000.04,51,43
aA,M15,299,000.03,M,285,000.02,51,4D
aA,M15,303,000.02,M,336,000.02,51,47
aA,M15,291,000.03,M,200,000.64,51,48
aA,M15,291,000.02,M,301,000.03,51,48
aA,M15,243,000.04,M,172,001.52,51,42
aA,M15,236,000.03,M,090,000.08,51,44
aA,M15,243,000.03,M,099,000.09,51,4E
aA,M15,198,000.04,M,088,000.39,00,4B
aA,M15,180,000.04,M,099,000.09,00,41
aA,M15,180,000.03,M,345,000.03,00,4E
```

7.7. Heating Option

Heating is autonomous and requires no set-up once activated.

Upon unit switch on if heating is enabled and heater power available then a 1 minute burst of heating will occur to give confidence that the heating is functioning.

WARNING NOTE:-

When heating is activated the bullet and transducer arms will get very hot and should not be handled.

7.8. 45° Offset

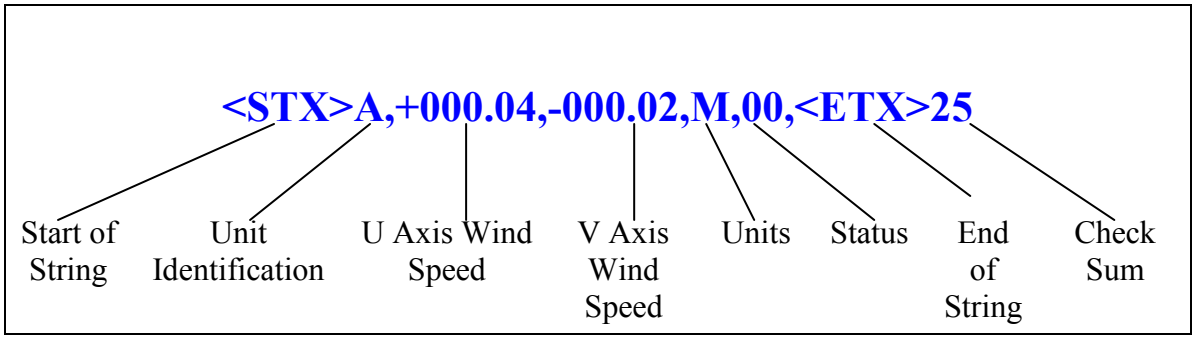
If required, the U axis can be offset +45° to the transducer axis.

7.9. Vertical Output Padding

A dummy W vector is inserted to provide compatibility with any WindMaster that may be in a network.

7.10. ASCII message format (UV and Polar)

ASCII UV format



Where

U axis wind speed In increments of 0.01 units (±UUU.UU)

V axis wind speed In increments of 0.01 units (±VVV.VV)

	Value	**Units**
Units	M	Metres per second (m/s)
	N	Knots (knots)
	P	Miles per hour (MPH)
	K	Kilometres per hour (kph)
	F	Feet per minute (fpm)

Start of string ASCII value 2

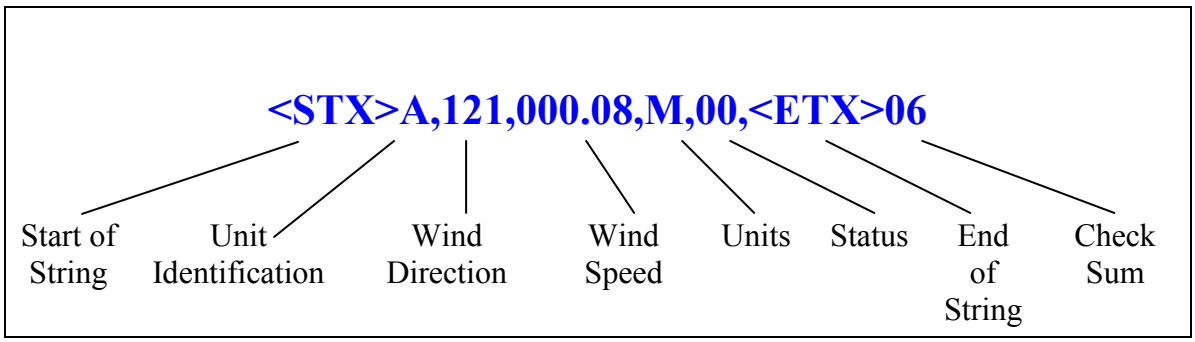
Unit identification Letter A – Z **(default A)**

Status	**Value**	**Status**
	0	OK
	60 or 66	Heating enabled and OK if enabled
	Any other value	Warning or fault condition *- see Section 9.5*

End of string ASCII value 3

Check sum Exclusive OR of all characters between Start of String and End of String reported as ASCII hex.

ASCII Polar format



Where

Wind direction	In degrees relative to N (DDD)
Wind speed	In increments of 0.01 units (±MMM.MM)
All other parameters	*See Section 7.10* ***ASCII UV format***

ASCII Polled (UV and Polar)

When in the Polled mode, an output is only generated when the host system sends a Poll signal to the WindObserver consisting of the WindObserver Unit Identifier – that is, the relevant letter A – Z.

The output formats are otherwise as described above.

The commands available in this mode are:

Description	Command	WindObserver response
WindObserver Unit Identifier	A ….. Z	Wind speed output generated
Enable Polled mode	?	(None)
Disable Polled mode	!	(None)
Request WindObserver Unit Identifier	&	A ….. Z (as configured)
Enter Configuration mode	*<N>	CONFIGURATION MODE

Where <N> is the unit identifier, if used in a multi-drop system then it is recommended that ID's A to F and KMNP are not used as these characters can be present in the data string.

It is suggested that in polled mode the following sequence is used for every poll for information.

? Ensures that the Sensor is enabled to cover the event that a power down has occurred.

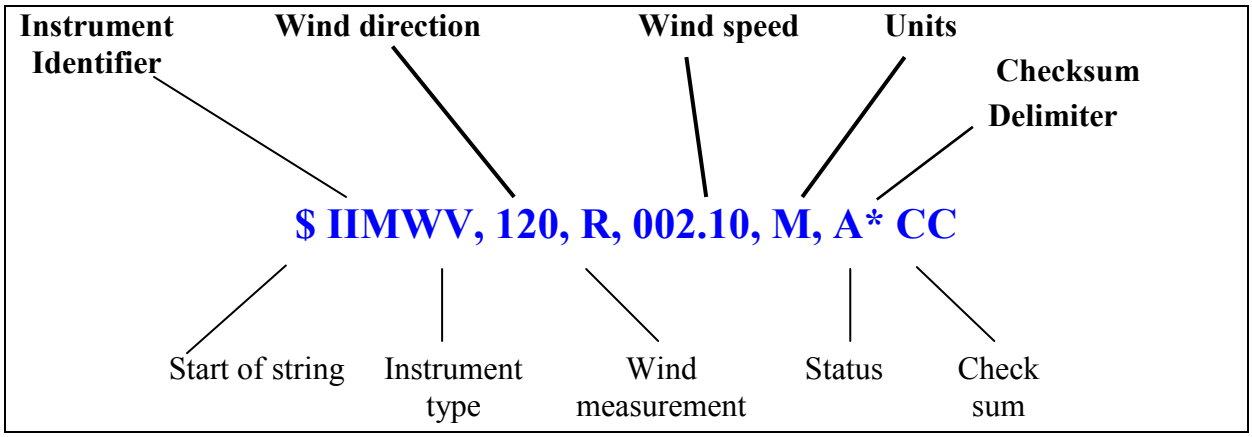
A-Z Appropriate unit designator sent to retrieve a line of data.

! Sent to disable poll mode and reduce possibility of erroneous poll generation.

When in polled mode the system will respond to the data command within 30mS with the last valid data sample as calculated by the Output rate (P Mode Setting).

If the unit is powered down after use or upon switch on then allow 3 seconds from switch on before sending poll commands.

7.11. NMEA Format



Where

Wind direction	In degrees relative to N (DDD)	
Wind speed	In increments of 0.01 units (±MMM.MM)	
Units	M	Metres per second (m/s)
	N	Knots (knots)
	P	Miles per hour (MPH)
	K	Kilometres per hour (kph)
	F	Feet per minute (fpm)
Start of string	$	
Instrument type	IIMWV	
Wind measurement	R	Relative wind measurement
Status	A	**A**cceptable measurement
	V	**V**oid measurement
Check sum	Exclusive OR of all characters between '$' and '*' reported as ASCII hex.	

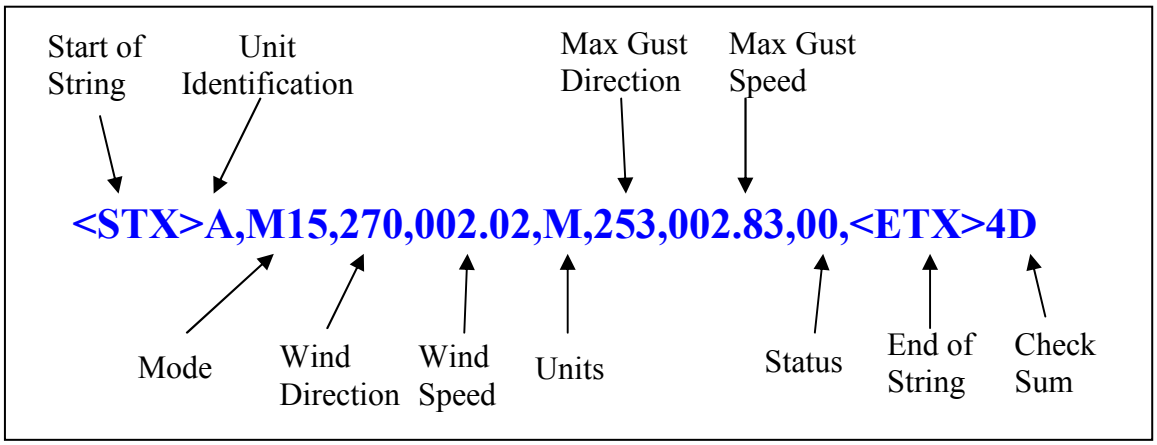
A typical WindObserver 90 configuration suitable for NMEA would be:

B2, E1, F1, G0, K1, L1, M5, O1, P1, U1.

Consult specification NMEA 0183 version 3 (available on the web) www.nmea.org for complete interface details.

7.12. Averaging Format (Modes 14 and 15)

See also Para 7.6.2.



Start of string	ASCII value 2	
Unit identification	Letter A – Z (**default A)**	
Mode	M14	Polled Averaging
	M15	Continuous Output Averaging
Wind Direction		In degrees relative to North (DDD) settable average of direction in degrees.
Wind Speed		In increments of 0.01 units (±MMM.MM), settable average of speed in m/s.
Units	M	Metres per Second
	N	Knots
	P	Miles per Hour
	K	Kilometres per Hour
	F	Feet per Minute
Max Direction Gust		In degrees relative to North (DDD)
Max Gust Speed		In increments of 0.01 units (±MMM.MM)
Status	**Value**	**Status**
	00	OK
	60	Heating enabled and OK if enabled
	51	Means that the averaging is incomplete (non-heat enabled units only).
	Any other value	Warning or fault condition *- see Section 9.5*
End of string	ASCII value 3	
Check sum	Exclusive OR of all characters between Start of String and End of String reported as ASCII hex.	

8. CONFIGURING

The WindObserver 90 can be configured using Terminal emulator software such as HyperTerminal.

Alternatively it is possible to use Gill Wind Software as a Terminal program only (Wizard and Sync Comms not applicable). Wind will run on PC's up to and including Windows 7 and can be downloaded from:-http://www.gill.co.uk/main/software.html.

8.1. Configuring using HyperTerminal

Note – Other terminal emulators are configured in a very similar way.

1. Decide on an available Com port that you want to use (Usually Com1).
2. Run Hypertrm.exe (Typically accessed via Start →All Programs →Accessories →Communications→Hyperterminal).
3. Create a New Connection (File → New Connection)
4. Enter a **Name** (eg WindObserver) .
5. Change '**Connect Using**' to 'Direct to Com 1' (or other Com port as required)
6. Adjust the Port settings to match WindObserver settings. WindObserver default settings are :

   Bits per second 9600

   Data bits 8

   Parity None

   Stop bits 1

   Flow Control (Handshaking) None

   Click on OK and data similar to the following example will scroll on screen at the output rate:

   ☺ A, 229, 002.74, M, 00, ♥ 06

8.2. Entering Configuration mode

From Continuous mode

Type *

From Polled mode

Type *N - where N is the Unit Identifier.

Note - the Unit Identifier must be entered as upper-case

The WindObserver 90 responds with a CONFIGURATION MODE message, stops reporting wind measurements, and waits for a command (as detailed below).

8.3. Returning to Measurement mode

Type Q and press ENTER

If in **Continuous** mode, the anemometer responds with wind measurements immediately, continuing at the selected Sampling rate.

If in **Polled** mode,

?	Enables poll
N	Polls anemometer (where N is the Unit identifier entered as upper-case)
	The anemometer replies with a single set of wind measurements
&	Anemometer replies with Unit identifier
!	Disables poll

Note:- If the unit is in Polled Mode it is always best to interrogate the unit for data with a ? before the poll identifier to cater for the event that the power has been switched off or power interrupted.

If used in a multi drop system then it is recommended that Unit Identifiers A, B, C, D, E, F, K, M, N and P are not used.

8.4. Checking the configuration

We strongly recommend that, as a standard procedure, you use this command (D3) prior to, and after, changing any settings. It shows the current settings for all the alterable settings. We suggest you note down your settings, so that you can easily return to them.

Type * Enters Configuration Mode (from Continuous mode)

Or Type * N Enters Configuration Mode (from Polled mode)

Type D3 and press ENTER The WindObserver 90 responds with the current settings.

The factory default settings for a heated unit are: -

A0 B3 C1 E1 F1 G0000 H2 J1 K1 L1 M2 NA O1 P1 T1 U1 V1 X1 Y1 Z1

Or factory default settings for an unheated Unit are:-

A0 B3 C1 E1 F1 G0000 J1 K1 L1 M2 NA O1 P1 T1 U1 V1 X1 Y1 Z1

To return to Measurement mode Type Q and press ENTER

How to change these settings is explained in the following sections.

8.5. Changing settings

To change a setting, first go into Configuration mode and then refer to the sections below. Enter the Configuration code of the new setting required, followed by ENTER.
If successful, the new setting will be echoed back as a message by the WindObserver 90.

For example, to change the message format to NMEA, enter Type M5 and press ENTER . The WindObserver 90 will reply with M5. When the unit is returned to the Measurement mode Type Q and press ENTER, it will be in NMEA format.

Note: The factory-set (default) settings are shown in **bold** in the following sections.

8.6. Configuration Settings

Ax – Not Applicable

Bx - Baud Rate

Setting	Configuration code
2400	B1
4800	B2
9600	**B3**
19200	B4
38400	B5
1200	B6

To change the Baud rate when using HyperTerminal: -

Eg. If set to B3 (9600 baud) and it is required to set to Baud rate to B2 (4800 baud).

Type * to enter Configuration Mode.

Type B 2 and press ENTER, **(Do not type any further commands at this stage).**

Close the 9600 Baud HyperTerminal connection.

Open HyperTerminal and set the new connection Baud Rate to 4800 baud.

Type B and press ENTER, the letter B will be shown followed by Capitol B2

Type Q and press ENTER, data will scroll at the new baud rate.

Cx- Not applicable.

Dx- Diagnostic and Configuration Command (see also Section 9.6)

Each of these commands causes a response from the WindObserver 90.

Item	Command code	Typical response
Type and Serial No.	D1	*12400001 (where * = E (Unheated unit) or F (Heated Unit)
Software version	D2	6.01
Unit configuration	D3	Current configuration: A0 B3 C1 E1 F1 G0000 H2 J1 K1 L1 M2 NA O1 P1 T1 U1 V1 X1 Y1 Z1
Analogue ID (if present)	D4	No analogue fitted.
Anemometer power supply voltage	D5	+29.8
Integrity check	D6	See Para 9.6 Bench Tests

Ex - Full Duplex/Half Duplex Mode

Setting	Configuration code
Full duplex	**E1**
Half duplex	E2

Note: - Refer also to Para 7.3 Networking Configuration details.

Fx- Data and Parity Options

Setting	Configuration code
8 bits, no parity, 1 stop bit	**F1**
8 bits, even parity, 1 stop bit	F2
8 bits, odd parity, 1 stop bit	F3

Note: If changing to F2, using a Terminal program then when in configuration mode Type F2 and press Enter, close the terminal program and open a new one with Even parity settings, then type F and press Enter.

Gx to Gxxxx - Averaging (Digital Outputs only)

Setting	Configuration code
Averaging (Default)	**G0000**

Enter the required averaging period in seconds as a four-figure number between 0000 and 3600.

Hx - Heating

Heating is autonomous and requires no set-up once activated.

Setting	Configuration code
Disabled	H1
Activated	**H2**
Activated	H3

H2 command selects heater fault codes 62, 63, 64 and 65.

H3 command selects heater fault codes 66, 67, 68 and 69.

Jx - Not applicable

Kx – NMEA Settings

Setting	Configuration code
NMEA string “IIMWV”	**K1**
NMEA string “WIMWV”	K2

Lx - ASCII Message Terminator

Setting	Configuration code
CR LF	**L1**
LF	L2

Mx to Mxx - Message Format

Output format	Configuration code
ASCII UV Continuous	M1
ASCII Polar Continuous	**M2**
ASCII UV Polled (tri-state) *	M3
ASCII Polar Polled (tri-state) *	M4
NMEA Continuous	M5

* If units are to be networked, they MUST be given unique Unit Identifiers.

Nx - Node Address

Item	Options	Command
Node Address	**A… -**(A to Z)	**N<A>**

If used in a multi-drop system then it is recommended that ID's A to F and K, M, N and P are not used, as these characters can be present in the data string.

Ox – ASCII Output Format (Output String Padding)

Setting	Configuration code
Comma Separated Variable (CSV)	**O1**
Fixed Field	O2

Example data strings:-

POLAR	NMEA
CSV data changing to error status code condition.	**CSV** data changing to error status code condition.
┐ A,235,000.77,M,60,└ 0A	$IIMWV,191,R,000.55,M,A*19
┐ A,,,M,04,└ 24	$IIMWV,,R,,M,V*29
Fixed Field data changing to error status code condition.	**Fixed Field** data changing to error status code condition.
┐ A,266,000.73,M,60,└ 08	$IIMWV,191,R,000.55,M,A*19
┐ A,999,999.99,M,04,└ 0A	$IIMWV,999,R,999.99,M,V*07

Px - Output Rate

Outputs per second	**1**
Configuration code	**P1**

Q- Measurement Mode

See Section 8.3.

RWASHORT XX (Short term number)

Where XX = 10 to 60, associated with Mode 14 and Mode 15 averaging.

RWALONG XX (Long term number)

Where XX = 1 to 10, associated with Mode 14 and Mode 15 averaging.

Tx - Not Applicable.

Ux – Digital Output Units

Units	**metres/sec (m/s)**	knots (knots)	miles / hour (MPH)	kilometre/hour (kph)	feet / minute (fpm)
Configuration code	**U1**	U2	U3	U4	U5

Vx- Vertical Output Padding

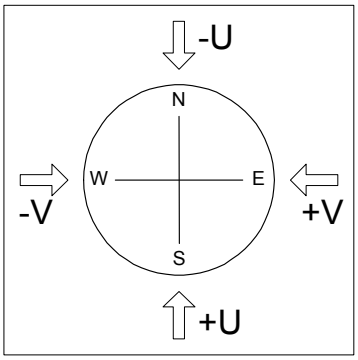
Setting	Configuration code
Disable vertical output padding	**V1**
Enable vertical output padding	V2

Xx - 45° Alignment Offset/Inverted Operation

Setting	Configuration code	Notes
Align U axis with transducer axis	**X1**	**X1. Aligns U axis with North/South axis.**
Align U axis +45° to transducer axis	X2	X2. This re-aligns both U&V and polarity 45˚ to transducer axis.
Reverses Polar Direction	X3	X3 reverses reported polar direction to allow the instrument to be mounted upside down. N.B. Does NOT affect UV alignment (Mode 1, 3).
Align @ 45° from North	X4	X4 set polar alignment at 45 degrees from North when instrument is mounted upside down. Does NOT affect UV alignment (Mode 1, 3).

Figure 4 shows the polarity of U and V if the wind components along the U and V axis are blowing in the direction of the respective arrows.

Figure 4 UV Polarity



Yx – Not Applicable.

Zx – Not Applicable.

9. MAINTENANCE & FAULT-FINDING

9.1. Cleaning and Handling

When installing the unit handle with lint free gloves and degrease the unit to reduce the build-up of deposits.

If there is any build-up of deposit on the unit, it should be gently cleaned with a cloth, moistened with soft detergent. Solvents should not be used, and care should be taken to avoid scratching any surfaces. The unit must be allowed to defrost naturally after being exposed to snow or icy conditions, do NOT attempt to remove ice or snow with a tool.

When heating is activated the bullet and transducer arms will get very hot and should not be handled.

Do NOT remove black "rubber" transducer caps.

9.2. Servicing

There are no moving parts or user-serviceable parts requiring routine maintenance.

Opening the unit or breaking the security seal will void the warranty and the calibration.

In the event of failure, prior to returning the unit to your authorised Gill distributor, it is recommended that:

- All cables and connectors are checked for continuity, bad contacts, corrosion etc.
- A bench test is carried out as described in Section 9.6.
- Contact your supplier for advice if failure persists.

9.3. Fault-finding

Symptom	Solution
No output	Check DC power to WindObserver 90, cable and connections. Check comms settings of WindObserver 90 (as detailed in Section 8) and host system match, including correct Com port Check unit is in Continuous mode Check that in-line communication devices are wired correctly. NOTE: It is usual for Anemometer TX + to be connected to converter device RX +
Corrupted output	Check comms settings of WindObserver 90 and host system match. Try a slower baud rate. Check cable lengths and type of cable.
One way communication	Check wiring is in accordance with the manual.
Failed/Incorrect output, data invalid flag	Check that transducer path is not blocked

9.4. Safe Mode

If a unit is received that will not communicate or the configuration settings are not known then Safe Mode can be used to establish communication with the WindObserver 90 and change configuration settings.

Initial Set Up.

The WindObserver 90 RS422 Pair 1 and Pair 2 TX and RX output connections (4 wires) are connected to a PC via an RS422 to RS232/USB Converter.

Open a Terminal program e.g. Windows HyperTerminal (or use Gill Wind Software as a Terminal program).

Select the required COM port.

Set the Baud rate to 19200 baud (if using the Wind Terminal program it opens at 19200 baud).

To Place the unit into Safe Mode.

Turn off the WindObserver 90.

Ensure the Terminal program is set for **19200** baud,

Hold down the PC keyboard * key and turn on the WindObserver 90 Power Supply.

The words SAFE MODE should appear on the terminal screen.

If not then power down the WindObserver 90, hold the * key and re-power sensor.

To now check the unit: -

Type D1 and press Enter, to see serial number.

Type D2 and Press Enter to see Firmware version.

Type D3 to see configuration settings,

```
SAFE MODE
D1
F922036
D1
D2
5.00
D2
D3
current configuration :
A0 B2 C1 E1 F1 G0000 H2 J1 K1 L1 M5 NA O2 P1 T1 U1 V1 X1 Y1 Z1
```

Change settings if required.

Type Q and press Enter to go back into measurement mode.

If powering down the instrument and repowering and no change has been made to the baud rate (B command) then open a new terminal program at the units original baud rate setting (the default setting would be 9600 Bauds).

9.5. Status (error) codes

The Status code is sent as part of each wind measurement message.

Note: Status Codes 60 to 69 are only applicable to a unit with the heating option.

Code	Status	Condition
00	OK Heating set off	Valid data, sufficient samples in average period
60 (H2)	**OK and heating enabled**	**Valid data, sufficient samples in average period**
A	OK	NMEA data Acceptable
01	Axis 1 failed	Insufficient samples in average period on U axis
02	Axis 2 failed	Insufficient samples in average period on V axis
04	Axis 1 and 2 failed	Insufficient samples in average period on both axes
08	NVM error	NVM checksum failed, data could be uncalibrated.
09	ROM error	ROM checksum failed, data could be uncalibrated.
51	Measurement average building.	Data valid but warns that average period not reached when averaging used (non-heat enabled units only).
62 (H2)	No power to heating module	Valid data still output
63 (H2)	Hardware fault – e.g. Heater pcb faulty	Valid data still output.
65 (H2)	Warning – Heater Supply volts too high or pcb too hot.	Valid data still output.
V	NMEA data Void	Invalid data output
66 (H3)	OK and heating enabled	Valid data, sufficient samples in average period
67 (H3)	No power to heating module	Valid data still output.
68 (H3)	Hardware fault – e.g. Heater pcb faulty	Valid data still output.
69 (H3)	Warning – Heater Supply volts too high or pcb too hot.	Valid data still output.

9.6. Bench test

Data Tests

1. Couple the WindObserver 90 to the host system and power supply, using a known working test cable.
2. Check that the unit is correctly configured by going into Configuration mode and using D3. *See Section 8.4 Checking the Configuration.*
3. Check for normal output data, and that the Status Code is OK – 00, 60, 66 or A (for NMEA format).
4. If the status code is other than these, refer to Section 9.5 Status (error) codes.
5. Use an office fan or similar to check that the unit is sensing wind, turning the unit to simulate changing wind direction and to check that both axes are functioning.
6. Note that this is a quick functional test. There are no calibration adjustments; the unit is designed NOT to require re-calibration within its lifetime.

Heater Tests (Heater Option (Only)

1. Connect the WindObserver Sensor and Heater connections to a 24v dc, 7A or greater supply.
2. Switch on the 24v dc supply and observe that the peak heater current drawn is greater than 4 amps.
3. Heating current will be taken for about 60 seconds, check that after this period each of the 4 sensor bullets is warm to touch.

Use of an Integrity Check Chamber (Optional Item)

The Integrity Check Chamber (ICC) is designed to:

1. Provide a zero wind environment to confirm the WindObserver zero calibration.
2. Identify any gross changes in the head geometry that would affect the performance.

The ICC has been designed to be used in an indoor still air environment with an ambient temperature between 17°C and 23°C. When conducting the test it is important that the ICC is assembled on to the WindObserver head and not touched or moved during the test.

This test is only valid if undertaken with an ICC purchased from Gill.

Note:- The Heater supply should be disconnected or turned off when using the ICC.

Zero Wind Check

Configure your PC to run HyperTerminal and assemble the ICC by inserting the reflector cases and the two halves of the ICC onto the WindObserver 90. The ICC must be retained using the strips provided. Then:

1. Ensure that the WindObserver 90 is set for Polar (M2) mode. For Factory default settings see section 8.4.
2. Enter Measurement Mode and Record/View data

In still air wind speed measurements should not exceed 0.03m/s. If wind speed exceeds 0.03m/s contact Gill Instruments.

Alignment Check

Ensure the ICC is assembled correctly on the WindObserver 90 and heating supply turned off. Using HyperTerminal, enter Configuration Mode as described in Section 8.

Enter D6.

A typical report as shown below will be displayed.

```
D6
ALIGMENT LIMITS: U=2424,2524
                 V=2434,2434
ALIGNMENT U:2474 *PASS*
ALIGNMENT V:2484 *PASS*
D6
```

If ‘Refer to Manual’ is shown check test temperature conditions are 17 to 23 deg C and tested under zero wind condition.

If there has been no significant changes to The WindObserver 90 head configuration then *PASS* will confirm correct operation.

Alterations to the head geometry can result in a *FAIL* or ‘Insufficient Samples’ message. If this occurs please contact Gill Instruments.

9.7. Returning units

If the unit has to be returned, it should be carefully packed in the original packaging and returned to your authorised Gill distributor, with a full description of the fault condition.

10. APPENDICES

10.1. Glossary & Abbreviations

Item	Meaning
CAL	Calibration
CR	Carriage Return
CRLF	Carriage Return Line Feed
CSV	Comma Separated Variable
ENG	Engineering
ESC	ESCape key on keyboard used to stop any process that is being executed
ETX	End of string character
FAC	Factory
fpm	Feet per minute
GND	GrouND
HEX	HEXadecimal
I/P	InPut
IP66	Protection Classification
KPH	Kilometres per Hour
LF	Line Feed
m/s	Metres per second
MAG	MAGnitude - scalar reference to wind speed
MAX	MAXimum
MPH	Miles per Hour
NEMA	National Electrical Manufacturers Association
NMEA 0183 (version 3)	National Marine Electronics Association standard for interfacing marine electronic navigational devices
No:	Number
NVM	Non-Volatile Memory
O/P	Output
PC	IBM compatible Personal Computer
PCB	Printed Circuit Board
POR	Power On Reset
PROCOMM	Terminal emulator software package
ROM	Read Only Memory
RS232	Communications standard

Item	Meaning
RS422	Communications standard
RS485	Communications standard
RTS	Request To Send
RWA	Road Weather Averaging
RX	Receive
RXD	Received Data
S/W	SoftWare
SOS	Speed Of Sound
SEC	SECond
STX	Start of string character
TERM	TERMinal
TX	Transmit
TXD	Transmitted Data
+VE	Positive
-VE	Negative
WindCom	Gill software used to configure WindObserver 90
WRT	With Respect To

10.2. Guarantee

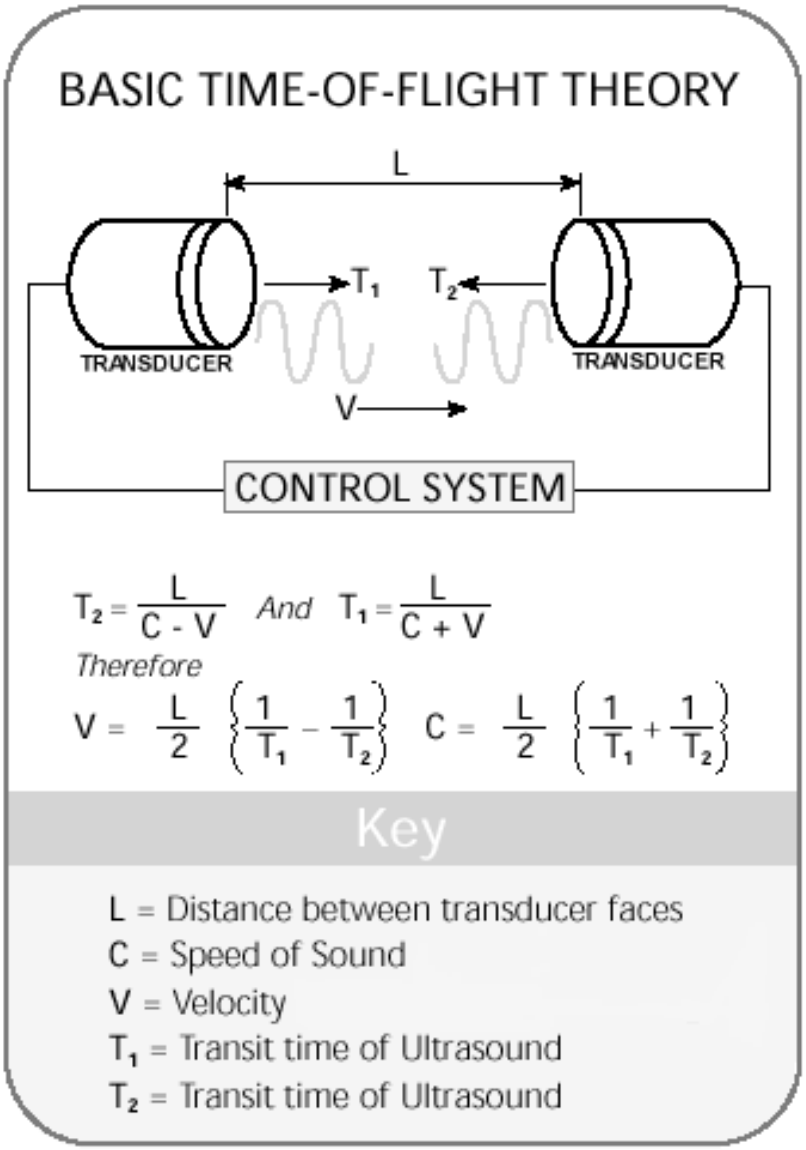
For terms of guarantee contact your supplier.

Warranty is void if the green security seal covering base nuts is damaged or broken, or the transducer caps have been damaged.

10.3. Principle of operation

The WindObserver 90 measures the times taken for an ultrasonic pulse of sound to travel from the North transducer to the South transducer, and compares it with the time for a pulse to travel from S to N transducer. Likewise times are compared between West and East, and E and W transducer.

If, for example, a North wind is blowing, then the time taken for the pulse to travel from N to S will be faster than from S to N, whereas the W to E, and E to W times will be the same. The wind speed and direction (and the speed of sound) can then be calculated from the differences in the times of flight on each axis. This calculation is independent of factors such as temperature.



10.4. Electrical Conformity

EC DECLARATION OF CONFORMITY ACCORDING TO COUNCIL DIRECTIVE 2004/108/EC

We, Gill Instruments Ltd., declare our sole responsibility that the products:

WindObserver 90 Ultrasonic Anemometer

Manufactured by: Gill Instruments Ltd
Saltmarsh Park
67 Gosport Street
Lymington, SO41 9EG

to which this declaration relates, are in conformity with the protection requirements of Council Directive 2004/108/EEC on the approximation of the laws relating to electromagnetic compatibility.

This Declaration of Conformity is based upon compliance of the product with the following harmonized standards:

EN60945:2002
EN61326:2006

Emissions	Using EN60945 and EN55011
Immunity	Using EN61000-4-2 to EN61000-4-5
	EN 61000-4-6 (Excluding 150khz to 200khz Conducted Immunity)
	EN 61000-4-11

Signed by:

A.C.R. Stickland – Director

Date of issue: 19/09/2012

Place of issue: Gill Instruments Ltd
Saltmarsh Park
67 Gosport Street
Lymington, SO41 9EG